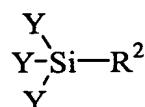


WHAT IS CLAIMED IS:

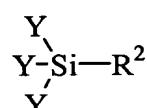
1           1. A method for forming a diffusion barrier layer comprising the steps of:  
2                   a) preparing a silicon substrate;  
3                   b) contacting the silicon substrate with a composition comprising self-  
4 assembled monolayer subunits and a solvent; and,  
5                   c) removing the solvent  
6                   thereby forming the diffusion barrier.

1           2. The method according to claim 1, wherein the self-assembled  
2 monolayer subunit is of the following structure:



3  
4 wherein Y is an O-alkyl group, and wherein R<sup>2</sup> is an alkyl group, heteroalkyl group, aryl  
5 group or heteroaryl group.

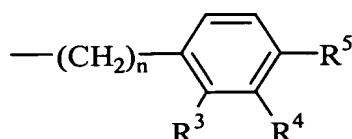
1           3. The method according to claim 1 wherein the self-assembled  
2 monolayer is of the following subunit wherein Y is a halogen, and wherein R<sup>2</sup> is an alkyl  
3 group, heteroalkyl group, aryl group or heteroaryl group.



4           4. The method according to claim 1, wherein the silicon substrate  
5 preparation comprises the formation of a silicon oxide surface.

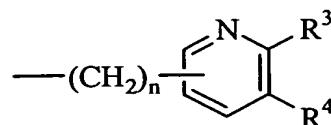
1           5. The method according to claim 1, wherein the method further  
2 comprises the step of heating the silicon substrate and the composition during contact.

1           6. The method according to claim 2, wherein R<sup>2</sup> is an alkyl group of the  
2 following structure:



3  
4 wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently selected from the group consisting of hydrogen,  
5 alkyl groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO,  
6 COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging  
7 from 1 to 5.

1 7. The method according to claim 2, wherein R<sup>2</sup> is an alkyl group of the  
2 following structure:



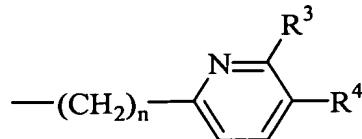
5  
6 wherein R<sup>3</sup> and R<sup>4</sup> are independently selected from the group consisting of hydrogen, alkyl  
7 groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO,  
8 COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging  
9 from 1 to 5.

1 8. The method according to claim 5, wherein Y is OCH<sub>3</sub>.

1 9. The method according to claim 6, wherein Y is OCH<sub>3</sub>.

1 10. The method according to claim 7, wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are hydrogen  
2 and n is 2.

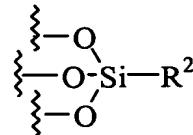
1 11. The method according to claim 8, wherein R<sup>2</sup> is an alkyl group of the  
2 following structure:



3  
4 and wherein R<sup>3</sup> and R<sup>4</sup> are hydrogen and n is 2.

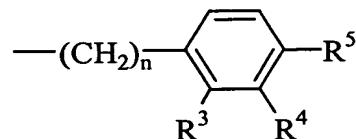
1 12. A diffusion barrier layer in an integrated circuit, wherein the diffusion  
2 barrier comprises a self-assembled monolayer.

1                   13.    The diffusion barrier according to claim 11, wherein the self-  
2   assembled monolayer comprises subunits, and wherein the subunits are of the following  
3   structure:



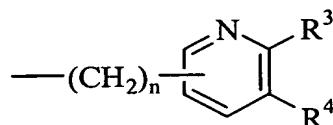
4  
5   wherein R<sup>2</sup> is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

1                   14.    The diffusion barrier according to claim 12, wherein R<sup>2</sup> is an alkyl  
2   group of the following structure:



3  
4   wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently selected from the group consisting of hydrogen,  
5   alkyl groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO,  
6   COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging  
7   from 1 to 5.

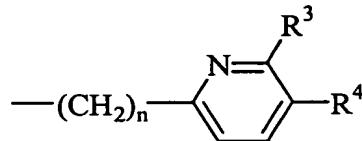
1                   15.    The diffusion barrier according to claim 12, wherein R<sup>2</sup> is an alkyl  
2   group of the following structure:



3  
4   wherein R<sup>3</sup> and R<sup>4</sup> are independently selected from the group consisting of hydrogen, alkyl  
5   groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO,  
6   COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging  
7   from 1 to 5.

1                   16.    The diffusion barrier according to claim 13, wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are  
2   hydrogen and n is 2.

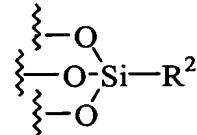
1                   17.     The diffusion barrier according to claim 14, wherein R<sup>2</sup> is an alkyl  
2     group of the following structure:



3  
4     and wherein R<sup>3</sup> and R<sup>4</sup> are hydrogen and n is 2.

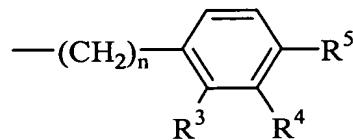
1                   18.     An integrated circuit comprising a silicon substrate, a diffusion barrier  
2     layer and a metal deposited on the diffusion barrier layer, wherein the diffusion barrier is  
3     covalently attached to the silicon substrate, and wherein the diffusion barrier is a self-  
4     assembled monolayer.

1                   19.     The integrated circuit according to claim 17, wherein the self-  
2     assembled monolayer comprises subunits of the following structure:



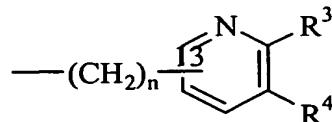
3  
4     wherein R<sup>2</sup> is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

1                   20.     The integrated circuit according to claim 18, wherein R<sup>2</sup> is an alkyl  
2     group of the following structure:



3  
4     wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently selected from the group consisting of hydrogen,  
5     alkyl groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO,  
6     COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging  
7     from 1 to 5.

1                   21.     The integrated circuit according to claim 18, wherein R<sup>2</sup> is an alkyl  
2     group of the following structure:

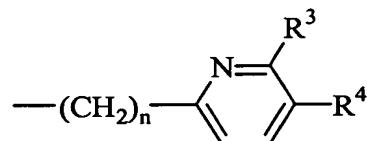


3  
4 wherein R<sup>3</sup> and R<sup>4</sup> are independently selected from the group consisting of hydrogen, alkyl  
5 groups, heteroalkyl groups, halo groups, NH<sub>2</sub>, NHR<sup>6</sup>, NR<sup>6</sup>R<sup>7</sup>, OH, OR<sup>6</sup>, SH, SR<sup>6</sup>, CHO,  
6 COOH and CN, and wherein R<sup>6</sup> and R<sup>7</sup> are alkyl groups, and wherein n is an integer ranging  
7 from 1 to 5.

1                   22. The integrated circuit according to claim 19, wherein R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are  
2 hydrogen and n is 2.

1                   23. The integrated circuit according to claim 20, wherein R<sup>2</sup> is an alkyl  
2 group of the following structure:

3



4  
5 and wherein R<sup>3</sup> and R<sup>4</sup> are hydrogen and n is 2.  
6